also, in some measure, between the lateral portions of the prostate gland and the bladder. It was evidently a lobe of the prostate gland; and its ducts passed directly through the coats of the bladder, and opened immediately behind the verumontanum.

A still more distinct appearance of this lobe was afterwards found in a subject twenty-four years of age; a representation of which accompanies this paper.

This newly acquired anatomical fact enables us, Mr. Home says, to understand the nature of a disease, of which we could not have a clear idea while we were ignorant of the existence of the part in which it originates: it also enables us to explain various circumstances respecting the disease, particularly what to our author has ever appeared the greatest difficulty, namely, the protrusion of the tumour into the cavity of the bladder. This protrusion arises from the hard substance of the coats of the *vasa deferentia* being in close contact, and bound down upon the lobe; so that, from its first enlargement, it must press up the thin coats of the bladder. The situation of this lobe, and its connexion with the *vasa deferentia*, also render it liable to many causes of swelling, from which the body of the gland is free; since every irritation of the seminal vessels, or of their orifices, may be communicated to it by continuity of parts.

There is much reason, our author says, to believe that the diseased state of the lateral parts of the gland, so common in the later periods of life, has its origin in the lobe here described; for, in most of the cases examined by him, this lobe has been enlarged in a much greater degree, in proportion to its size, than any other part of the gland; and the difficulty in passing the urine, which comes on very early in the disease, is, Mr. Home thinks, owing to the enlargement of this lobe; since an enlargement of the lateral portions of the gland widens the canal instead of diminishing it. The enlargement of the lobe also occasions the bladder to retain a considerable part of the urine; and as the urine passes in a stream, and the quantity voided is sufficient, no suspicion is entertained of the cause of the frequency and distress in passing it; but they are referred to an irritable state of the coats of the bladder.

From the above observations it appears that the small lobe of the prostate gland here treated of is, from its situation and the circumstances in which it is placed, more liable to become diseased than any other part of the gland; and that it produces symptoms of danger and distress which are peculiar to itself, but which have been hitherto supposed to arise from the body of the gland becoming enlarged.

On the Quantity and Velocity of the Solar Motion. By William Herschel, *LL.D. F.R.S.* Read February 27, 1806. [*Phil. Trans.* 1806, *p.* 205.]

The present paper is a continuation of that communicated to the Society by Dr. Herschel last year, in which he considered the direc-

tion of the solar motion: he now proceeds to consider the quantity and velocity of that motion; and as, in the former paper, the proper motions, when reduced to one direction, were called quantities, to distinguish them from the velocities required in the moving stars to produce those motions, so also in the present inquiry, it will, the author says, be necessary to keep up the same distinction with respect to the velocity of the solar motion. To determine this, we ought to have in view the real motion of every star whose apparent motion we know; but as trials with a number of stars would be very inconvenient, Dr. Herschel makes use only of the six stars mentioned in his former paper, in laying down the method followed with all the rest.

He first considers the proportional distance of the stars; for till this is fixed upon, neither the parallactic nor the real motion of a star can, he says, be ascertained. And as it is not sufficiently satisfactory to divide the stars into a few magnitudes, and suppose these to represent their relative distances, he expresses the relative brightness of the six stars already alluded to, according to the notation formerly used by him for that purpose; and from that introduces, by using fractional distinctions, a more minute subdivision than has been commonly admitted. He then proposes the following arrangement, as expressing their proportional distance:—Sirius 1·00, Arcturus 1·20, Capella 1·25, Lyra 1·30, Aldebaran 1·40, Procyon 1·40.

Our author next considers the effect of the increase and decrease of the solar motion, and the conditions to be observed in the investigation of its quantity. He gives a table, calculated with a view to show that an increase or decrease of the solar motion will have a contrary effect upon the required real motion of different stars: and deduces from it, that a certain equalization, or approach to equality, may be obtained between the motion of the stars, or between that of the sun and any one of them selected for that purpose. These calculated velocities, he says, are such as would be true, if the stars were at the assumed distances, and if their real motions were performed in lines at right angles to the visual ray; but if the stars do not move in that direction, we should still certainly have the minimum of their velocities: and it must be allowed to be a considerable point gained if we could show what is likely to be the least velocity of the solar motion. Besides, if the velocities of any two stars are equalized when their motions are supposed to be perpendicular to the visual ray, they will be as much so when they make any other given angle with it; and it is the equalization, not the quantity of the velocities, that is required.

It is, Dr. Herschel says, evident, that either a certain mean rate, or a middle rank, should be assigned to the motion of the sun, unless very sufficient reasons should induce us to depart from this condition; and he thinks it most eligible to prefer the latter; but says, that nearly the same result will be obtained from either of the methods. He adds, that if we can at the same time bring the sidereal motions

to a greater equality among each other, it will be a very proper secondary consideration.

The necessary calculations for investigating the solar motion may, our author says, be divided into two classes: the first of these will remain unaltered, whatever may be the solar motion under examination; while the other must be adjusted to every change that may be required. The first will contain the angular quantity of the observed or apparent motion; its direction with the parallel of the star; its direction with the parallactic motion; and its velocity: the second, or changeable part, will consist of the angular quantity of the real motion; the parallactic direction of this motion; and its velocity.

A table containing the result of the calculations relating to the permanent quantities of 36 stars is now given: there are also various figures illustrating the said calculations: upon these, various remarks are made, which cannot be well understood without a view of the figures. We shall only observe, that several stars of the first magnitude appear to have less velocity than many which are much smaller. This, Dr. Herschel thinks, may be explained, if a solar motion is introduced; as the parallax arising from that cause will completely account for such a singular circumstance. He adds, that if the foregoing argument proves the expediency of admitting a solar motion, the direction of that motion is no less evidently pointed out to be in opposition to the motion of Arcturus.

By equalizing the velocities of the sun and α Orionis, the solar motion appears to be $1''{\cdot}266$. On the other hand, by a similar calculation of the velocities of Pollux and the Sun, those velocities will be equalized by a solar motion of $0''{\cdot}967$. These seem to be the limits of the solar motion, upon the supposition of its holding a middle rank among the sidereal velocities; and, by a mean of them, we may have the rank of the solar motion true to less than $0''{\cdot}15$. Upon this supposition, a table of the changeable quantities above mentioned is given, and also figures illustrating them.

Dr. Herschel, after observing that, if we except only ten of the above-mentioned stars, all the rest appear to be actuated by the same influence, and, like the sun, to direct their motions towards the same part of the heavens, proceeds to examine the causes of this marked singularity in their direction; which, he says, may arise either from their mutual gravitation towards each other, or from an original projectile force impressed upon them. As both these causes are known to act on all the bodies belonging to the solar system, they may reasonably be supposed to exert their influence likewise on the stars: and that this is really the case, our author endeavours to show by various arguments, which our limits necessarily oblige us to omit. He shows that the motions of the stars already mentioned cannot be accounted for by the mutual gravitation of neighbouring stars towards each other, or by a periodical binal revolution of them about a centre of gravity; but that we ought rather to have recourse to some far distant centre of attraction; which centre may

be either a single body of great magnitude; or it may be produced by the joint attraction of a great number of stars united into one condensed group; or, lastly, it may be formed by the union of several groups, which, he says, will create a still more powerful centre of gravitation.

Dr. Herschel now proceeds to the determination of the quantity and velocity of the solar motion: and, calculating upon the principles laid down in the course of the present paper, assuming, as we have already stated, that the solar motion holds a middle rank among the sidereal velocities, it appears that we have sufficient reason to fix upon the quantities of the solar motion to be such as, by an eye placed at right angles to its direction, and at the distance of Sirius from us, would be seen to describe annually an arch of 1·116992 of a degree; and its velocity, till we are acquainted with the real distance of the fore-mentioned star, can therefore only be expressed by the proportional number of 1116992.

Before he concludes, our author remarks, that the middle rank among the sidereal velocities, which he has assigned to the sun, agrees sufficiently with the phenomena that were to be explained. Thus the apparent velocities of Arcturus and Aldebaran, without a solar motion, are to each other as 208 to 12; but, according to the assumed solar motion, it appears, that when the deception arising from the parallactic effect is removed, these velocities are to each other only as 179 to 85, or 2 to 1. And although Arcturus still remains a star which moves with great velocity, yet it has been shown, in the eleventh table, that we have three or four stars with nearly as much motion, and five with more. The solar motion also removes the deception by which the motion of a star, of the consequence of α Orionis, is so concealed as hardly to show any velocity; whereas, by computation, we find that it really moves at a rate which is fully equal to the motion of the sun.

It will now be found, Dr. Herschel says, that we are within the reach of a link of the chain which connects the principles of the solar and sidereal motions with those that are the cause of orbitual ones: the probable motions of the sun and of the stars in orbits consequently becomes a subject that may receive the assistance of arguments supported by observations. And he further observes, that what he has said in a former paper, where the sun is placed among the insulated stars, does not contradict the present idea of its forming a part of a very extensive system. The insulation there ascribed to the sun relates merely to a supposed binary combination with some neighbouring star; and it has been already proved, by the example of Arcturus, that the solar motion cannot be occasioned, or accounted for, by a periodical revolution of the sun and the above, or any other star, about their common centre of gravity.